Lösung der Übungen zur Berechnung von Nullstellen von quadratischen Funktionen mit p-q-Formel

Aufgabe	Rechenweg	Ergebnis
$x^2 - 6x + 8 = 0$	$x^2 - 6x + 8 = 0 \Leftrightarrow x_{1,2} = -\frac{-6}{2} \pm \sqrt{\left(\frac{-6}{2}\right)^2 - 8} = 3 \pm 1 \Leftrightarrow x_1 = 4 \text{ v } x_2 = 2$	2; 4
$x^2 + 2x - 8 = 0$	$x^2 + 2x - 8 = 0 \Leftrightarrow x_{1,2} = -\frac{2}{2} \pm \sqrt{\left(\frac{2}{2}\right)^2 - (-8)} = -1 \pm 3 \Leftrightarrow x_1 = 2 \text{ v } x_2 = -4$	2; −4
$x^2 - 8x + 16 = 0$	$x^2 - 8x + 7 = 0 \Leftrightarrow x_{1,2} = -\frac{-8}{2} \pm \sqrt{\left(\frac{-8}{2}\right)^2 - 16} = 4 \pm 0 \Leftrightarrow x = 4$	4
$x^2 - 2x = 24$	$x^2 - 2x - 24 = 0 \Leftrightarrow x_{1,2} = -\frac{-2}{2} \pm \sqrt{\left(\frac{-2}{2}\right)^2 - (-24)} = 1 \pm 5 \Leftrightarrow x_1 = 6 \text{ v } x_2 = -4$	−4; 6
$x^2 - 10x + 30 = 0$	$x^2 - 10x + 30 = 0 \Leftrightarrow x_{1,2} = -\frac{-10}{2} \pm \sqrt{\left(\frac{-10}{2}\right)^2 - 30} = 5 \pm \sqrt{-5}$ keine Lösung, da die Wurzel aus einer negativen Zahl nicht gezogen werden kann	Ø
$x^2 - 45x + 324 = 0$	$x^2 - 45x + 324 = 0 \Leftrightarrow x_{1,2} = -\frac{-45}{2} \pm \sqrt{\left(\frac{-45}{2}\right)^2 - 324} = 22{,}5 \pm 13{,}5 \Leftrightarrow x_1 = 36 \text{ v } x_2 = 9$	9; 36
$x^2 + 4x = -3$	$x^2 + 4x + 3 = 0 \Leftrightarrow x_{1,2} = -\frac{4}{2} \pm \sqrt{\left(\frac{4}{2}\right)^2 - 3} = -2 \pm 1 \Leftrightarrow x_1 = -1 \text{ v } x_2 = -3$	−3; −1
$x^3 - \frac{3}{20}x^2 - \frac{1}{10}x = 0$	$x \cdot (x^2 - \frac{3}{20}x - \frac{1}{10}) = 0 \Leftrightarrow x_1 = 0 \text{ v } x_{2,3} = -\frac{-\frac{3}{20}}{2} \pm \sqrt{\left(\frac{-\frac{3}{20}}{2}\right)^2 - (-\frac{1}{10})}$ $\Leftrightarrow x_1 = 0 \text{ v } x_{2,3} = \frac{3}{40} \pm 0{,}325 = 0{,}075 \pm 0{,}325 \Leftrightarrow x_1 = 0 \text{ v } x_2 = -0{,}25 \text{ v } x_3 = 0{,}4$	−0,25; 0; 0,4

$4x^2 + 16x - 84 = 0$	$4x^2 + 16x - 84 = 0 \ /:4 \Leftrightarrow x^2 + 4x - 21 = 0$ $\Leftrightarrow x_{1,2} = -\frac{4}{2} \pm \sqrt{\left(\frac{4}{2}\right)^2 - (-21)} = -2 \pm 5 \Leftrightarrow x_1 = 3 \text{ v } x_2 = -7$	$-7; 3$
$-x^2 + 9x - 14 = 0$	$-x^2 + 9x - 14 = 0 \ /\cdot(-1) \Leftrightarrow x^2 - 9x + 14 = 0$ $\Leftrightarrow x_{1,2} = -\frac{-9}{2} \pm \sqrt{\left(\frac{-9}{2}\right)^2 - 14} = 4{,}5 \pm 2{,}5 \Leftrightarrow x_1 = 7 \text{ v } x_2 = 2$	$2; 7$
$4x^2 - 16x - 48 = 0$	$4x^2 - 16x - 48 = 0 \ /: 4 \Leftrightarrow x^2 - 4x - 12 = 0$ $\Leftrightarrow x_{1,2} = -\frac{-4}{2} \pm \sqrt{\left(\frac{-4}{2}\right)^2 - (-12)} = 2 \pm 4 \Leftrightarrow x_1 = 6 \text{ v } x_2 = -2$	$-2; 6$
$-6x^2 - 12x + 48 = 0$	$-6x^2 - 12x + 48 = 0 \ /: (-6) \Leftrightarrow x^2 + 2x - 8 = 0$ $\Leftrightarrow x_{1,2} = -\frac{2}{2} \pm \sqrt{\left(\frac{2}{2}\right)^2 - (-8)} = -1 \pm 3 \Leftrightarrow x_1 = 2 \text{ v } x_2 = -4$	$-4; 2$
$7x^2 + 21x = -14$	$7x^2 + 21x + 14 = 0 \ /: 7 \Leftrightarrow x^2 + 3x + 2 = 0$ $\Leftrightarrow x_{1,2} = -\frac{3}{2} \pm \sqrt{\left(\frac{3}{2}\right)^2 - 2} = -1{,}5 \pm 0{,}5 \Leftrightarrow x_1 = -1 \text{ v } x_2 = -2$	$-1, -2$
$2x^2 - \frac{11}{6}x + \frac{1}{3} = 0$	$2x^2 - \frac{11}{6}x + \frac{1}{3} = 0 \ /:2 \Leftrightarrow x^2 - \frac{11}{12}x + \frac{1}{6} = 0$ $\Leftrightarrow x_{1,2} = -\frac{-\frac{11}{12}}{2} \pm \sqrt{\left(\frac{-\frac{11}{12}}{2}\right)^2 - \frac{1}{6}} = \frac{11}{24} \pm \frac{5}{24} \Leftrightarrow x_1 = \frac{16}{24} = \frac{2}{3} \text{ v } x_2 = \frac{6}{24} = \frac{1}{4}$	$\frac{1}{4}; \frac{2}{3}$